

Application No.: 10/590,473
Response Dated: December 1, 2009
Reply to Office Action of: September 1, 2009

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Remarks/Arguments:

Claims 1-8 are pending in the above-identified application. Claims 7 and 8 have been withdrawn from consideration by the Examiner. Accordingly, claims 1-6 are presented for reconsideration.

Claims 1 and 4 stand rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 6,402,013 (hereinafter "Abe") in view of U.S. Patent No. 4,749,120 (hereinafter "Hatada"). Applicants respectfully traverse this rejection for the reasons set forth below.

Claim 1 recites features neither disclosed nor suggested by the prior art, namely:

. . . forming an adhesion reinforced part for fixing the main body to the substrate by heating and curing the adhesive by sealing the inside of the adhesive with solder part by fusing and solidifying of solder particles contained in the adhesive supplied in the adhesion reinforcing portion causing the adhesive to spread and contact a larger portion of the surface of the main body.
(Emphasis added).

Applicants' exemplary embodiment includes a substrate 1, an electrical component 5 and an adhesion reinforcing portion 7b. Electrical component 5 includes connection terminals 5a disposed at both ends of a main body 5b (See FIGS. 1C and 1D). The adhesion reinforcing portion 7b includes a solder paste 4. The solder paste 4 is a mixture of a metal component containing solder particles and thermosetting adhesive as described on page 7, lines 9-10 of the Applicants' specification. When heated, solder particles in the solder print part 4B are fused and solidified, and the solder part 6b fills and seals the inside of the adhesive. The adhesive component is heated and cured, and the second resin reinforced part 7b is formed for fixing the main body 5b of the electronic component 5 to the substrate 1. (See page 9, line 23 to page 10, line 4 and FIG. 3).

As shown at FIG. 1C of Applicants' exemplary embodiment, a portion of the lower surface of main body 5b contacts the adhesive 4B. Further, as shown at FIG. 1D, after the adhesive is heated, the adhesive spreads out and contacts a larger

portion of the lower surface of main body 5b. Thus, claim 1 recites "... forming an adhesion reinforced part for fixing the main body to the substrate by heating and curing the adhesive by sealing the inside of the adhesive with solder part by fusing and solidifying of solder particles contained in the adhesive supplied in the adhesion reinforcing portion causing the adhesive to spread and contact a larger portion of the surface of the main body."

As disclosed on page 9, lines 13-18 and illustrated in FIG.3 "[i]n the solder print part 4B supplied in the recess 3b, similarly, solder particles are fused, but since there is no wetting object of fused solder in the recess 3b, certain solder lumps 6b are formed in the adhesive component in fluid state. . . . [Because] the upside of the recess 3b is lower than the upside of the resist film 3 covering the electrode, the solder part 6b in fluid state does not disperse as solder balls, but is maintained at the same position," thereby giving rise to the claimed ". . . solidifying of the solder particles contained in the adhesive supplied in the adhesion reinforcing portion causing the adhesive to spread and contact a larger portion of the surface of the main body." By solidifying the solder particles within the resin, the resin is able to expand and the solder lumps 6b are trapped within the resin preventing the solder from short-circuiting the electronic component.

Abe discloses a thermosetting soldering flux and a soldering method using the thermosetting soldering flux. The flux is formed by adding a thermosetting resin (e.g., epoxy resin) to a conventional rosin flux. See Abe, Col. 3, lines 31-33. The flux may be mixed with a solder powder and used as a solder paste. See Col. 4, lines 21-23. "When carrying out soldering of chip component using [the solder paste], at the time of heating, the flux in the paste penetrates between the chip component and the printed substrate, and when soldering is completed, the thermosetting resin secures the chip component to the printed substrate." See Col. 4, lines 32-38.

Hatada discloses a method of connecting a semiconductor device to a wiring board. Electrical connection of metal bumps of a semi-conductor device and a wiring pattern of a wiring board is accomplished by pressure application between the bumps and wiring pattern. Mechanical fixing of the semi-conductor device on the wiring

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board is accomplished by stiffened resin which results in the semi-conductor device being fixed to the wiring board.

Applicants respectfully submit that based on the disclosures in Abe and Hatada, it would be impossible to combine the method described in Abe with the method described in Hatada. By combining the two methods as asserted in the Official Action, resin 22 would be a thermosetting soldering flux mixed with a solder mixture. As shown in Fig. 1b of Hatada, there is nothing to prevent the solder from touching the electrodes and causing a short circuit in the electronic component.

Thus, neither Abe, Hatada, nor their combination disclose or suggest ". . . forming an adhesion reinforced part for fixing the main body to the substrate by heating and curing the adhesive by sealing the inside of the adhesive with solder part by fusing and solidifying of solder particles contained in the adhesive supplied in the adhesion reinforcing portion causing the adhesive to spread and contact a larger portion of the surface of the main body," as recited in Applicants' claim 1.

Furthermore, Hatada discloses a method of connection which does not require a solder alloy, or the like. See Col. 2, lines 63-66. Therefore, one having ordinary skill in the art would not combine Hatada with Abe, because Abe teaches a composition including a solder. Accordingly, a combination of Abe with Hatada is improper.

Thus, Applicants respectfully submit that claim 1 is allowable over the art of record. Claim 4, while not identical to claim 1, includes features similar to those set forth above with regard to claim 1. Thus, claim 4 is allowable over the art of record for at least the reasons similar to those set forth above with regard to claim 1.

Claims 2 and 5 stand rejected under 35 U.S.C. § 103(a) as being obvious over Abe in view of Hatada and further in view of U.S. Patent No. 6,521,997 (hereinafter "Huang"). Claims 3 and 6 stand rejected under 35 U.S.C. § 103(a) as being obvious over Abe in view of Hatada and further in view of U.S. Patent No. 5,726,861 (hereinafter "Ostrem"). Ostrem discloses a method of surface mounting a component. Huang discloses a chip carrier for accommodating a passive component.

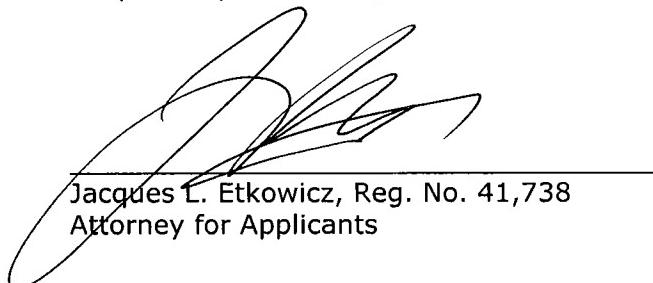
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Ostrem and Huang, however, do not make up for the deficiencies of Abe and Hatada described above with respect to claims 1 and 4. Claims 2 and 3 depend from independent claim 1. Accordingly, claims 2 and 3 are allowable at least because they depend from allowable claim 1. Claims 5 and 6 depend from independent claim 4. Accordingly, claims 5 and 6 are allowable at least because they depend from allowable claim 4.

In view of the foregoing remarks, Applicants submit that this Application is in condition for allowance which action is respectfully requested.

Respectfully submitted,



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